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EXAMINER

CHEN, WENPENG

ART UNIT PAPER NUMBER

2624

DATE MAILED: 03/18/2004

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/692,043

Applicant(s)

ISHIBASHI, HIDEYASU

Examiner

Wenpeng Chen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12/23/2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3,5-8, 10-11, 13-14 is/are rejected.
- 7) ☒ Claim(s) 2,4,9,12,15 and 16 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Examiner's responses to Applicant's remark

1. Applicant's arguments filed on 12/23/2003 have been fully considered but they are not persuasive. The Examiner has thoroughly reviewed Applicant's arguments but firmly believes that the cited reference to reasonably and properly meet the claimed limitation.

2. Responses to arguments with regard to art rejections set forth in paper #3

a. Applicant's argument -- Saghri does not teach "segmenting said multispectral image into a plurality of tile images." Instead, Saghri teaches "segmenting image by bands."

Examiner's response -- The Examiner disagrees with this conclusion. In the first paragraph of the section of "Compression System Overview," Saghri clearly teaches that "in the data partition module, the set of multispectral images are partitioned into sets of non-overlapping images: sub-block sets." A sub-block is a tile.

b. Applicant's argument -- Saghri does not teach "determination from the obtained principal component number of sets of an optimum principal component number of sets of optimum principal component vectors and corresponding optimum principal component images."

Examiner's response -- The Examiner cited page 39 of Saghri as teaching this feature. In the last second paragraph of page 39, Saghri does not JPEG-code some of the low-variance eigen images. The purpose is to optimize bit rate control. Therefore only some eigen images are selected (determined) for coding. Please note that an eigen image is a principal component image. Each eigen image is associated with a basic function described in the first and second

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paragraphs of the section of "Compression System Overview." An eigenvector shown in Fig. 1 is a principal component vector. When a set of eigen images is selected. The corresponding set of eigenvectors is also selected. Evidently, Saghri teaches the determination.

c. Applicant's argument -- Claim rejections based on 35 U.S.C. 103(a) set forth in paper #3 is based on the alleged invalid rejection based 35 U.S.C. 102. Therefore the rejections based on 35 U.S.C. 103(a) are also invalid.

Examiner's response -- As explained above, 35 U.S.C. 102 set forth in paper #3 is valid. Therefore, the rejections based on 35 U.S.C. 103(a) are also valid.

3. With regard to the objection set forth in paper #3, Applicant's arguments are not persuasive. The Applicant referred to page 18 for the teaching. However, the Applicant merely stated "determining an autocorrelation matrix T of this R for all pixels in the tile images" in the last two lines. No details are given for the procedure how the matrix is generated.

The Examiner maintains his objection to the specification set forth in paper #3.

Specification

4. The disclosure is still objected as explained in paper #3.

Claim Rejections - 35 USC § 102

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5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1, 5-8, 10-11, and 13-14 are rejected under 35 U.S.C. 102(b) as being anticipated by Saghri et al. ("Practical Transform Coding of Multispectral Image," John A. Saghri et al, IEEE Signal Processing Magazine, January 1995, pages 32-43, cited previously.)

a. For Claim 1, Saghri teaches a method of compressing a multispectral image composed of a plurality of spectral images of an object captured in a wavelength range divided into a plurality of bands, comprising the steps of:

-- segmenting said multispectral image into a plurality of tile images; (section "Compression System Overview", Left column, page 35 teaches that 512 by 1024 images are divided into 512 by 512 image sets. Left column, page 40 teaches dividing images into 64 x 64 and 32 x 32 blocks.)

-- performing principal component analysis on respective tile images to obtain for each tile image a principal component number of sets of principal component vectors and principal component images for the multispectral image; (sections "Compression System Overview" and "Spectral Decorrelation"; eigenvector and eigen images)

-- determining from said plurality of sets, for each tile image, an optimum principal component number of sets of optimum principal component vectors and corresponding optimum principal component images that optimally represent image information about the multispectral

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image; (page 39, especially the second method of coding eigen images; Some of the low-variance eigen images are not coded.)

-- expressing compressed image data for said multispectral image by means of at least said optimum principal component number of sets of optimum principal component images and optimum principal component vectors for each tile image. (Fig. 1 and section "Compression System Overview")

For Claim 5, Saghri further teaches the method according to claim 1, wherein an image size of said tile images in terms of pixel is expressed as a power notation of 2 in both a longitudinal and a transverse direction. (Left column, page 35 teaches that 512 by 1024 images are divided into 512 by 512 image sets. Left column, page 40 teaches dividing images into 64 x 64 and 32 x 32 blocks.)

For Claim 6, Saghri further teaches the method according to claim 1, wherein said tile images all have an image size in terms of pixel. (sections "Compression System Overview" and "Spectral Decorrelation")

Saghri also teaches the system of Claim 7 that corresponds to Claim 1 as evident with the above cited sections and Fig. 1. For Claim 14, Saghri also teaches:

-- wherein the tile images comprise spatial segmentation of the multispectral image to form multiple spatially adjacent image segments. (the first paragraph of the section of "Compression System Overview")

b. For Claim 8, Saghri teaches a method of compressing a multispectral image composed of a plurality of spectral images of an object captured in a wavelength range divided into a plurality of bands, comprising the steps of:

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-- segmenting said multispectral image into a plurality of tile images; (section "Compression System Overview", Left column, page 35 teaches that 512 by 1024 images are divided into 512 by 512 image sets. Left column, page 40 teaches dividing images into 64 x 64 and 32 x 32 blocks.)

-- performing principal component analysis on respective tile images to obtain for each tile image a principal component number of sets of principal component vectors, said principal component number of sets of principal component vectors represented by n ; (sections "Compression System Overview" and "Spectral Decorrelation"; eigenvector and eigen images; For example, first paragraph of page 37 teaches that n can be 16, 12, 8, or 4.)

-- determining from said principal component number of sets, for each tile image, an optimum principal component number of sets of optimum principal component vectors, said optimum principal component number of sets of optimum principal component vectors represented by m ; (page 39, especially the second method of coding eigen images; Some of the low-variance eigen images are not coded. The number of eigen images selected for coding is m .)

- wherein $m < n$; (As explained above, m is smaller than n .)

-- expressing compressed image data for said multispectral image by means of at least said optimum principal component number of sets of optimum principal component images and optimum principal component vectors for each tile image. (Fig. 1 and section "Compression System Overview")

Saghri also teaches the systems of Claims 11 and 13 that correspond to Claims 8 and 10 as evident with the above cited sections and Fig. 1.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Saghri as applied to Claim 1, and further in view of Keusen ("Multispectral Color System with an Encoding Format Compatible with the Conventional Tristimulus Model," Keusen, Journal of Image Science and Technology, Vol. 40, No. 6, Nov/Dec 1996, pages 510-515 cited previously.)

Saghri teaches the parental Claim 1. However, Saghri does not teach that the optimum principal component number is determined based on colorimetric values in a color space.

Keusen teaches encoding multispectral data including data having colorimetric values in a color space. (page 513)

It is desirable to have high quality of color reproduction without the need of transporting or storing large amount of image data. Keusen teaches a method using multispectral data for producing high quality of color reproduction with some kind of coding. Saghri teaches a method of compressing multispectral data with spectral decorrelation and JPEG -- resulting a very efficient compression. It would have been obvious to one of ordinary skill in the art, at the time of the invention, to combine the teachings of Keusen and Saghri to use Saghri's method to compress Keusen's data because the combination improves compression of the data for high-quality color reproduction.

Allowable Subject Matter

9. Claims 2, 4, 9, 12, and 15-16 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

a. A statement of reasons for the indication of allowable subject matter for Claims 2 and 4 has been given in paper #3.

b. The prior art fails to teach the method of Claim 9 and 12 which specifically comprise the following feature in combination of those recited in Claims 8 and 11:

-- wherein *m* is determined *based on a predetermined value*.

c. The prior art fails to teach the method of Claim 15 and 16 which specifically comprise the following feature in combination of those required for Claim 7:

-- wherein *a size of each tile image varies in accordance with at least one of hue, lightness and saturation* of the multispectral image at a position of the image file.

Conclusion

10. THIS ACTION IS MADE FINAL. See MPEP § 706.07(a). The Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for response to this final action is set to expire THREE MONTHS from the date of this action. In the event a first response is filed within TWO

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MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event will the statutory period for response expire later than SIX MONTHS from the date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wenpeng Chen whose telephone number is 703 306-2796. The examiner can normally be reached on 8:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David K Moore can be reached on 703 308-7452. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9306 for regular communications and 703-872-9306 for After Final communications. TC 2600's customer service number is 703-306-0377.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703 305-4700.

Wenpeng Chen
Examiner
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March 16, 2004

